



Nitrogen dynamics in low input Northern and Southern European cropping systems including grain legumes

Justes, E.; Mundus, S.; Hauggaard-Nielsen, Henrik; Jensen, Erik Steen

Publication date:
2008

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Justes, E., Mundus, S., Hauggaard-Nielsen, H., & Jensen, E. S. (2008). *Nitrogen dynamics in low input Northern and Southern European cropping systems including grain legumes*. Abstract from 6th European Conference on Grain Legumes, Lisbon, Portugal. http://www.risoe.dk/rispubl/art/2008_11_abstract.pdf

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Nitrogen dynamics in low input Northern and Southern European cropping systems with grain legumes

E. Justes*, H. Hauggaard-Nielsen**, S. Mundus** and E.S Jensen**

* INRA, UMR INRA-INPT/ENSAT 1248 AGIR, Castanet-Tolosan Cedex (France), justes@toulouse.inra.fr

** Risø National Laboratory, DTU, Biosystems Department, Roskilde Denmark)

Keywords: grain legume, nitrogen dynamics, nitrate leaching, soil-crop model, crop succession scale

Grain legumes have been inserted in cereal cropping systems for nitrogen economy and diversification purposes (1). In spite of the high N in soil after pea, there remains a great variability in N available for next crop, mainly due to variability in inorganic residual N at GL harvest which is related to the 2 following ratios: N fixation/N assimilation and N grain/N vegetative (2). Moreover, because of high N and water in soil at harvest, high N leaching is expected after pea during following rainy winter (3). After pea, only crops with efficient N taking-up in the autumn/winter should be grown to prevent N losses (e.g. oilseed rape, catch crop, intercrop) (3, 4). In order to better understand the effect of GL on N dynamics and to evaluate this nitrate leaching risk lysimeter and field experiments were carried out in low input cropping systems at RISØ institute (Denmark) and at INRA (SW France) during three years within the framework of the GLIP project. The final objective was to investigate the best means to mitigate this N loss from GL cropping and then to optimize the N valorisation coming from N₂ fixation for the succeeding crop and maintain soil fertility.

The results obtained during the three years experiments as well in France as in Denmark confirmed that i) GL is an efficient preceding crop for cereals as N uptake is significantly greater after pea or fababean than after non leguminous crops, and ii) nitrate leaching could be higher after GL in rainy conditions of winter. As a confirmation of results obtained few years ago in incubation studies, the incorporation of GL residues induced more net N immobilization than net N mineralization during the following months after soil tillage. Finally, cover crops were found efficient to decrease N amount in soil during autumn and then the risk of nitrate concentration in drained water.

Simulations were done using the STICS soil-crop model at the succession scale in order to better understand N dynamics in such a system. Various pedoclimatic scenarios of GL-cereal successions will be compared soon in terms of nitrate leaching in order to generalize there experimental results and to draw some operational conclusions in terms of N management at the cropping system scale including GL.

(1) Badaruddin M. and Meyer D.W. (1994) *Crop Sci.* 34, 1304-1309.

(2) Chalk P.M (1998) *Aust. J. Agric. Res.* 49, 303-316.

(3) Debaeke P., Nolot J.M., Raffaillac D. and Justes E. (2004) Proc.5th AEP Congress, Dijon (France), 57-58.

(4) Jensen E.S., Hauggaard-Nielsen H. Aveline A. and Crozat Y. (2004) Proc.5th AEP Congress, Dijon (France), 63-64.